

Requirements Engineering

- State-of-the-art and future outlook

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- Independent Consultant and Owner of Regnell Research
- PhD Software Engineering LTH 1999
- Director of studies (Studierektor) in Software Engineering LTH 2003-2007
- Lund University Pedagogical Prize 2005
- Chair of SiREN – Swedish Requirements Engineering Research Network
- Program Committee member of RE, REFSQ, CAiSE



Challenges in Competitive Requirements Engineering



Requirements are invented rather than discovered

State-of-practice

**Blinded by technology or
passively reacting on
current market**

State-of-the-art

- **Balancing market pull
and technology push**
- **Strategic innovation
process connected to
requirements engineering**



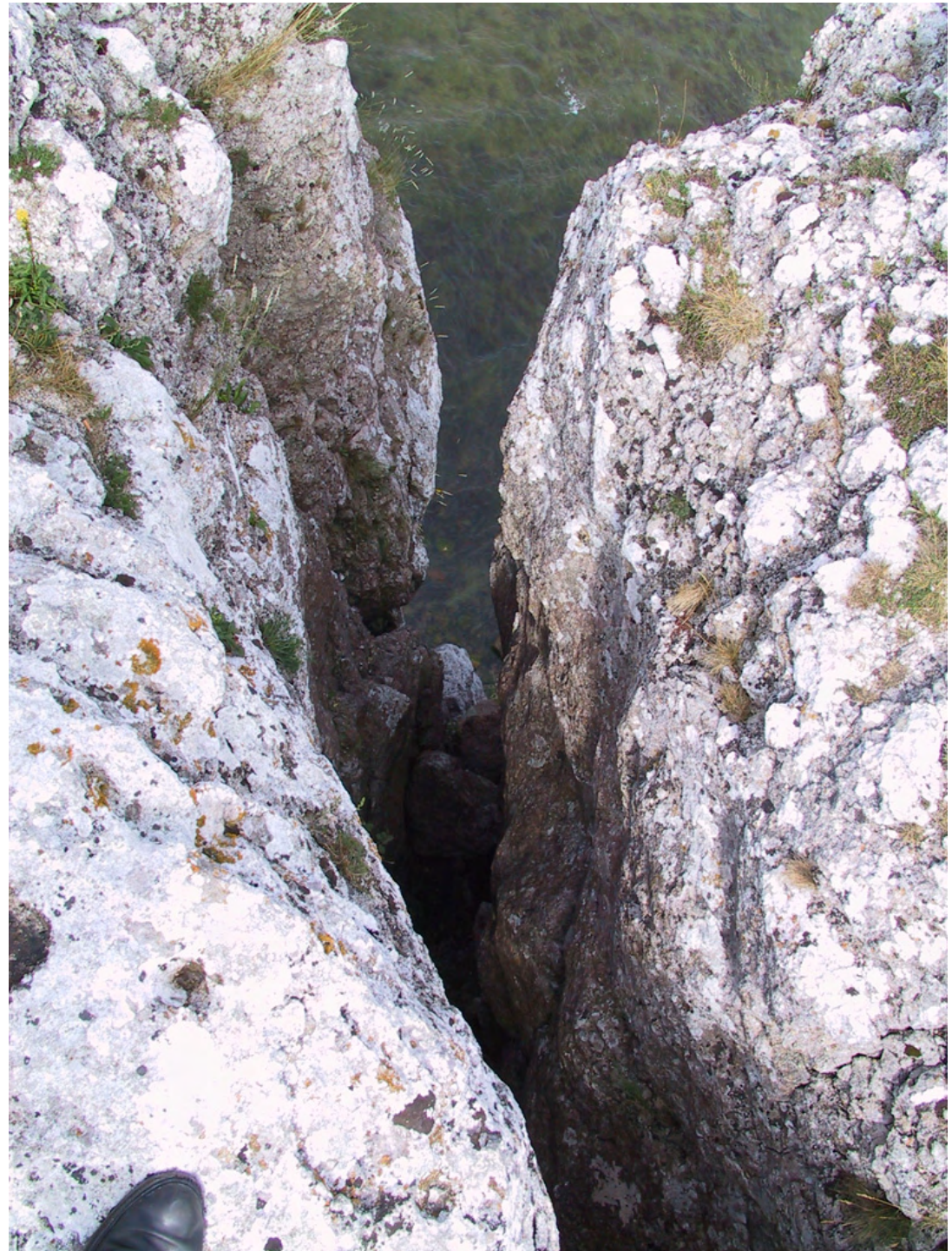
Chasm between marketing and development

State-of-practice

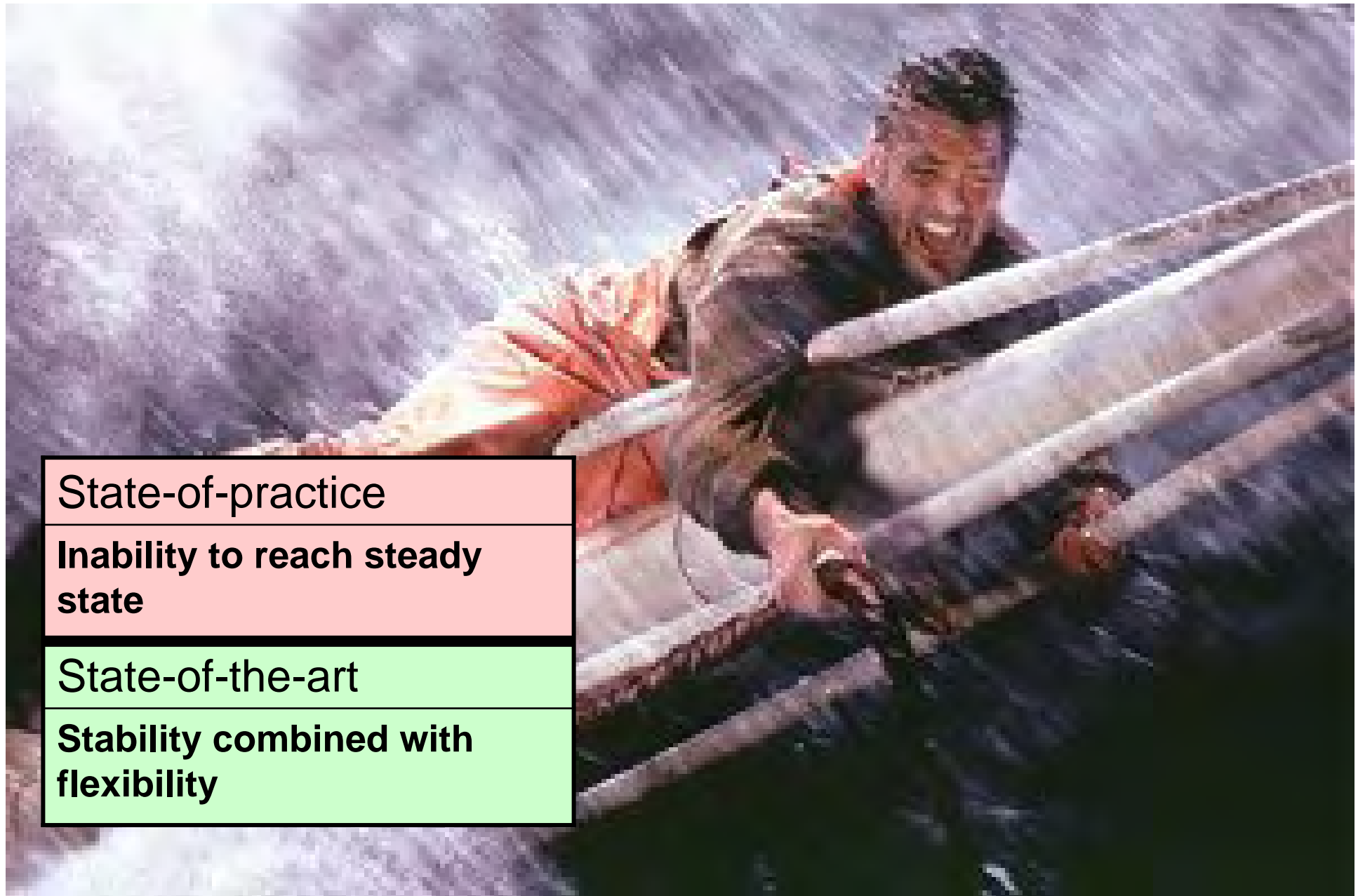
Engineering and marketing are not aligned

State-of-the-art

Common strategy and joint future vision of RE



Organisational instability and market turbulence

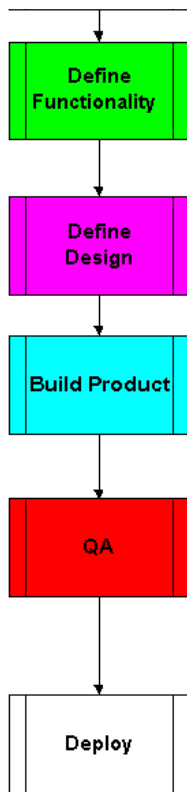


State-of-practice

Inability to reach steady state

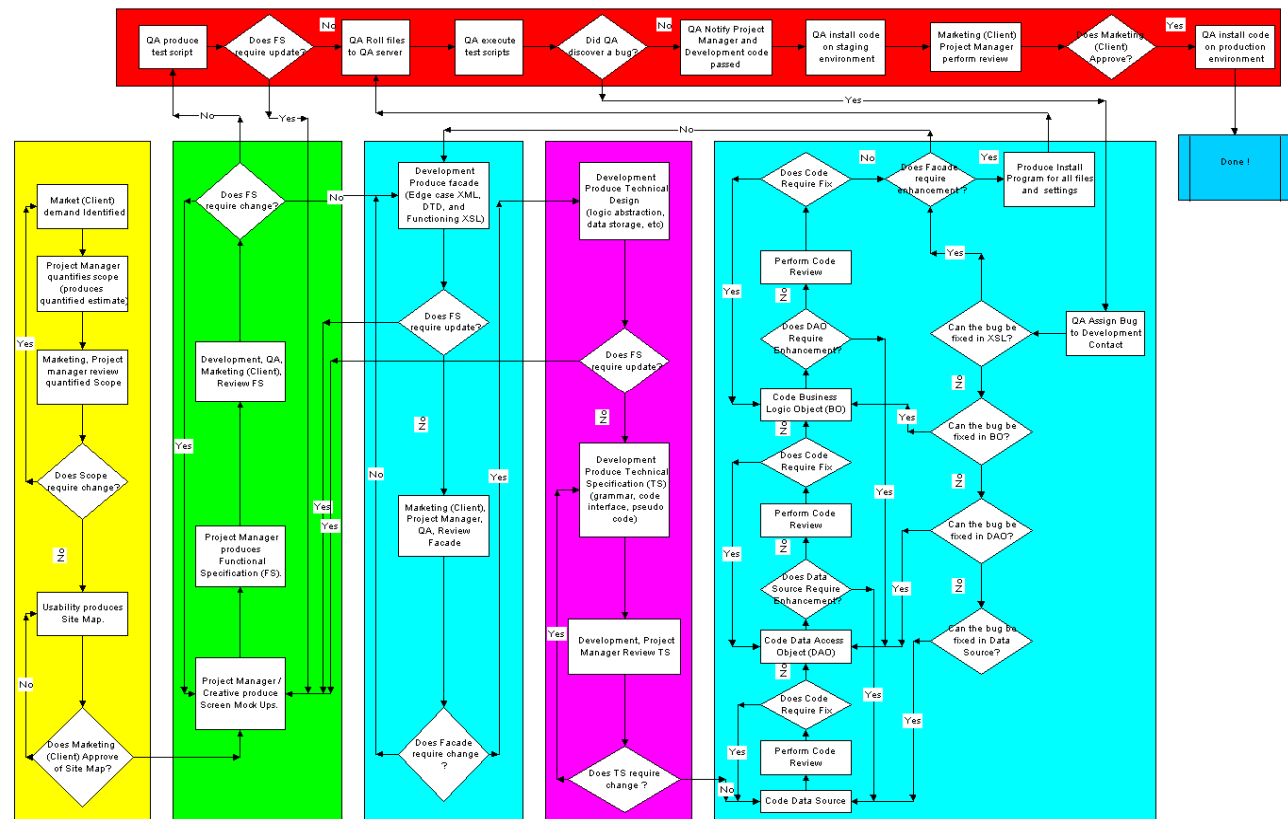
State-of-the-art

Stability combined with flexibility



Elementary or advanced process?

n-Tier Enterprise Web Application Development Process



State-of-practice

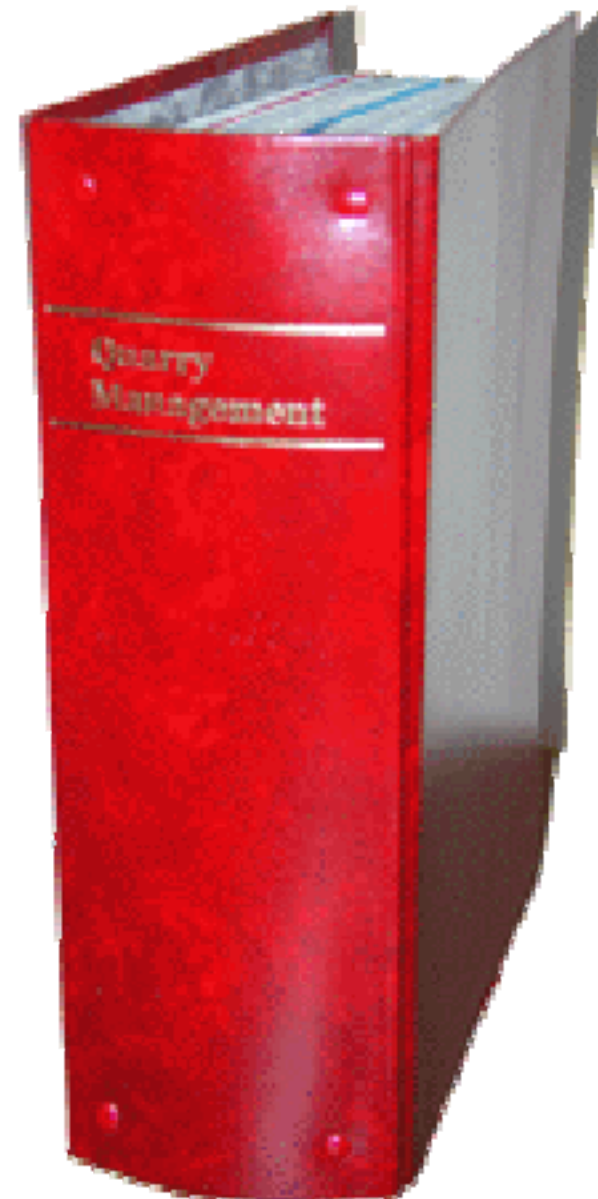
To small or too large process

State-of-the-art

Managed process evolution

**Specifications grow
and grow and
grow...**

State-of-practice
Monolithic specifications
State-of-the-art
Tailored Requirements Databases



Overloaded Requirements Management

State-of-practice

Process is trashed by lack of early screening

State-of-the-art

Controlled requirements selection quality and screening



Resource planning

Release planning

State-of-practice

Uncertain estimates of cost and value

State-of-the-art

Systematic learning from estimation outcomes



Living with changing requirements

State-of-practice

Engineers want to “freeze”
requirements

State-of-the-art

Continuous and controlled
allocation of requirements,
readiness for controlled
changes



Living with design infiltration

State-of-practice

Unnecesssary restrictions
imposed by low-level
requirements

State-of-the-art

Management of appropriate
requirements abstraction
level





Requirements dependencies and bundling

State-of-practice

**Dependencies are treated
ad hoc**

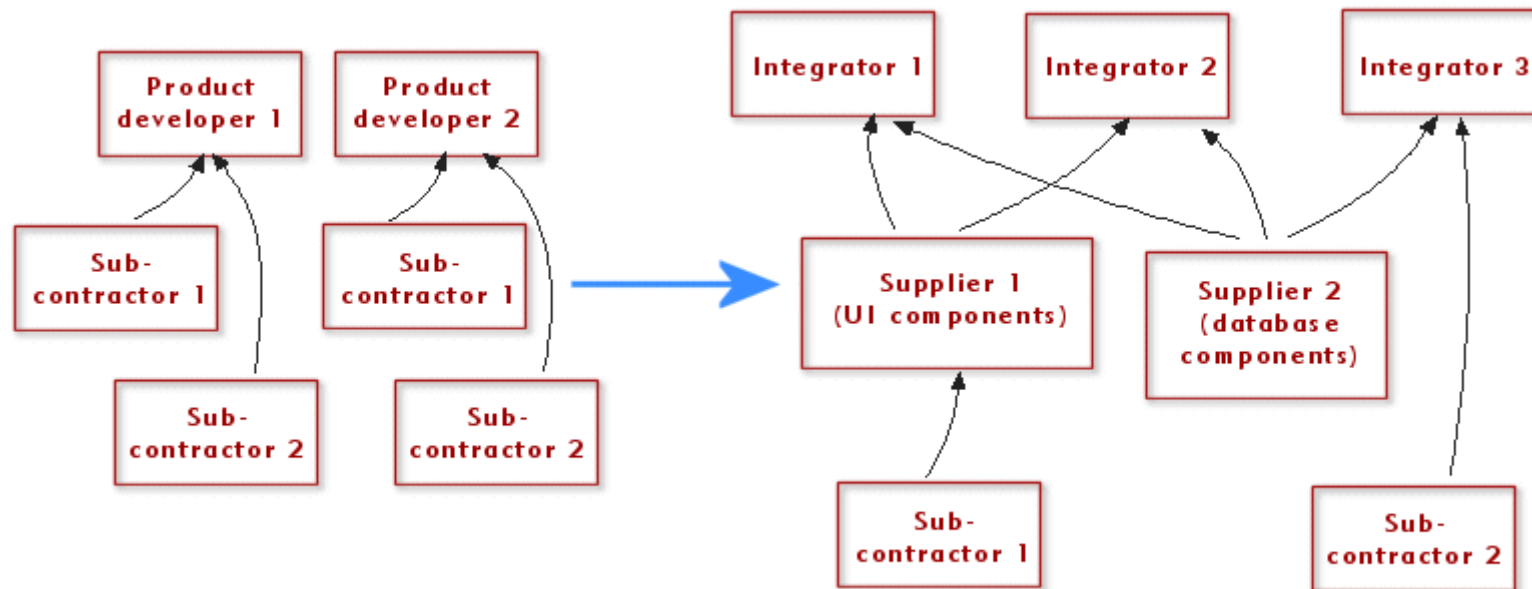
State-of-the-art

**Most important
dependencies are managed
by bundling and links**

Future Outlook

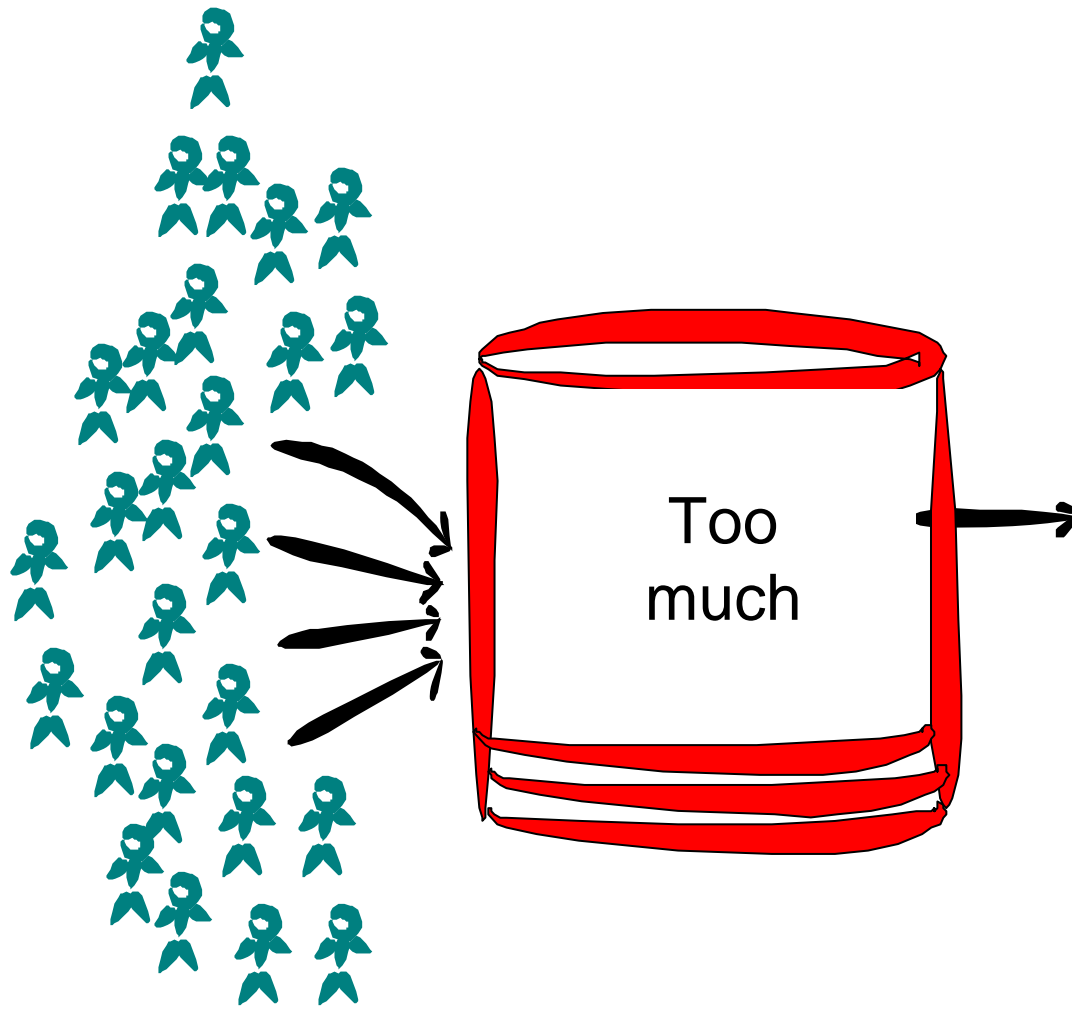


General trend in embedded systems industry



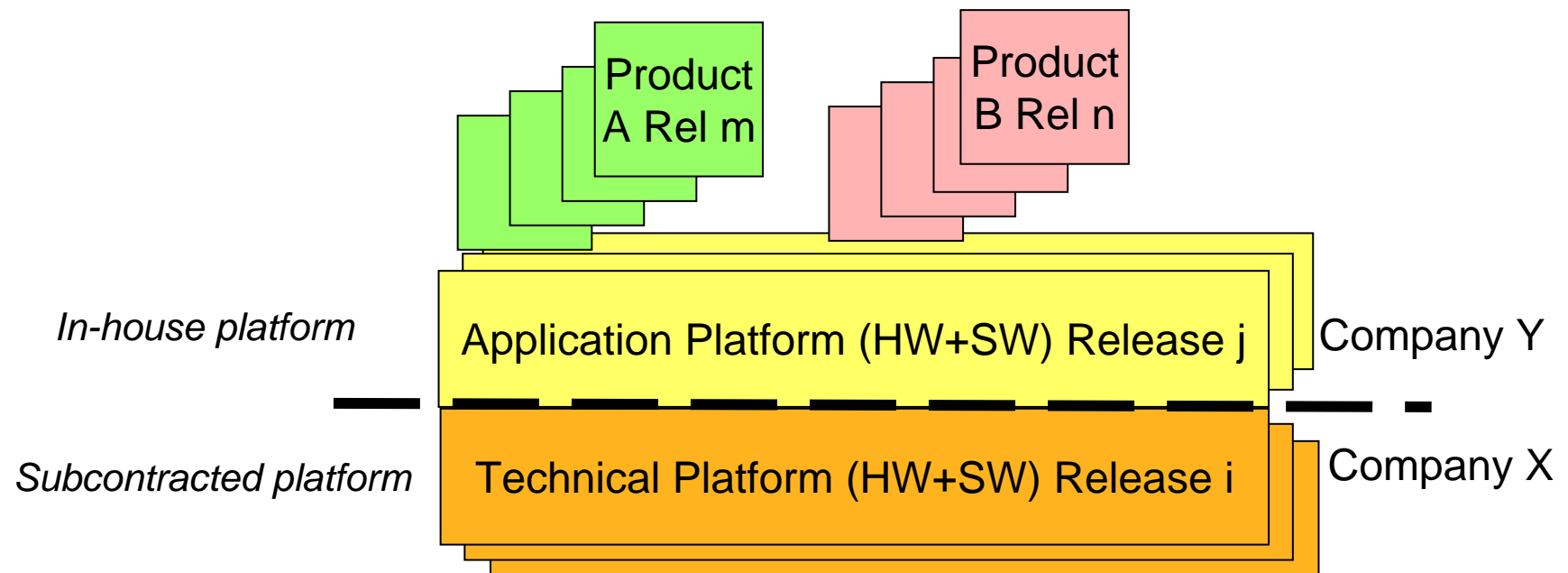
- The number of lines of code is increasing rapidly, we can not develop everything ourselves.
- Non-functional requirements are critical!!

Dealing with very large requirements databases

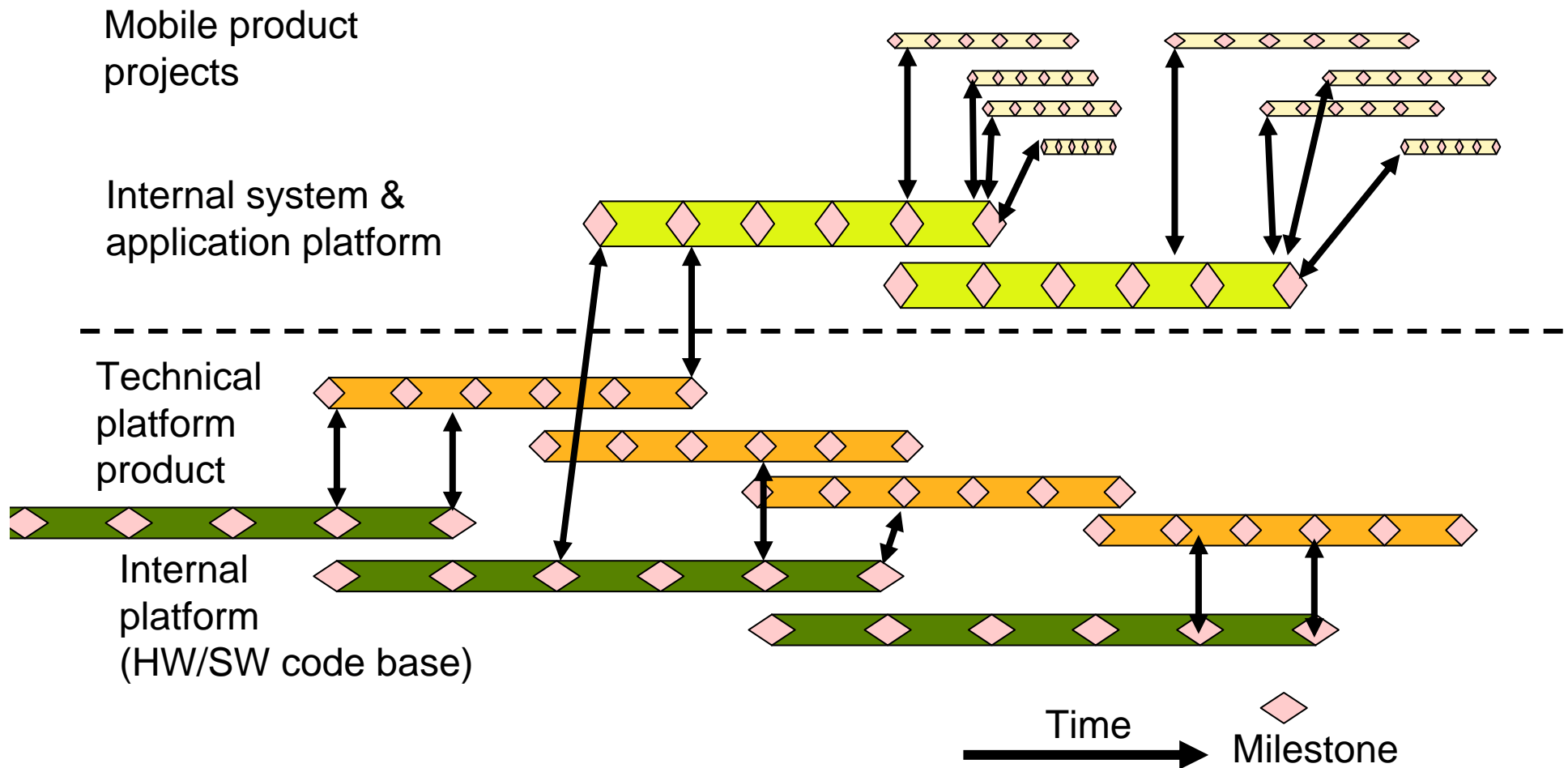


Profitable? Strategic?
Ambiguous? Related?
Complete? Group?
Split?
Reject? Expensive?

Layers of Platforms



Platforms as product lines => Synchronization Challenge



NFR challenge

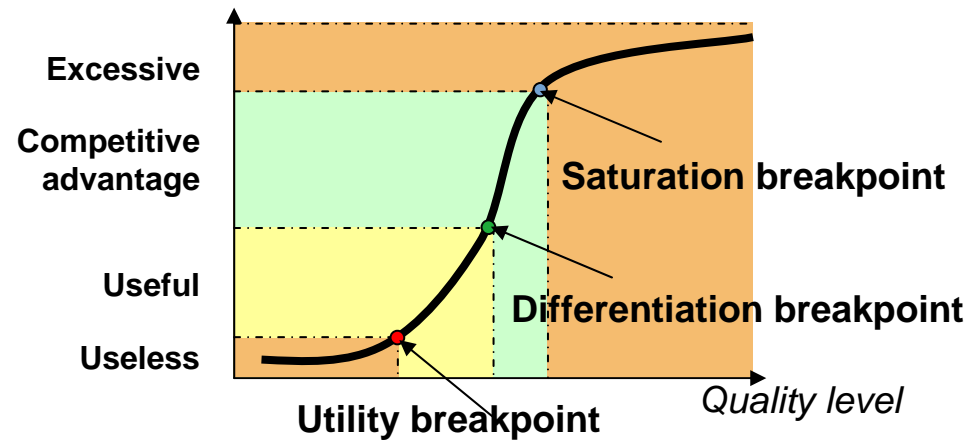
Systematic prioritization of **FEATURES**
is state-of-art in roadmapping and
platform/product scoping

...but...

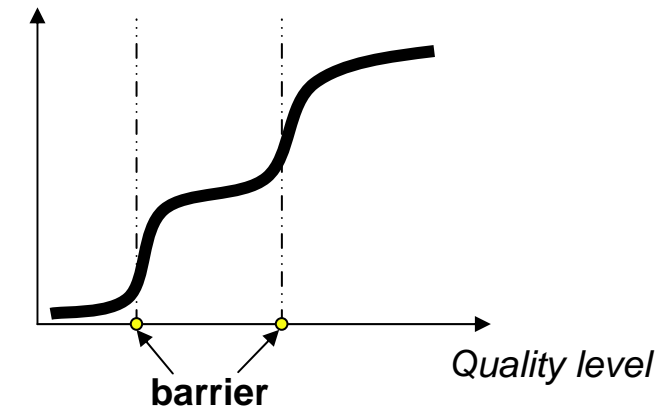
Prioritisation of **QUALITIES** is
handled ad hoc with no specific support for
NFR roadmapping

QUPER for Quality Roadmapping

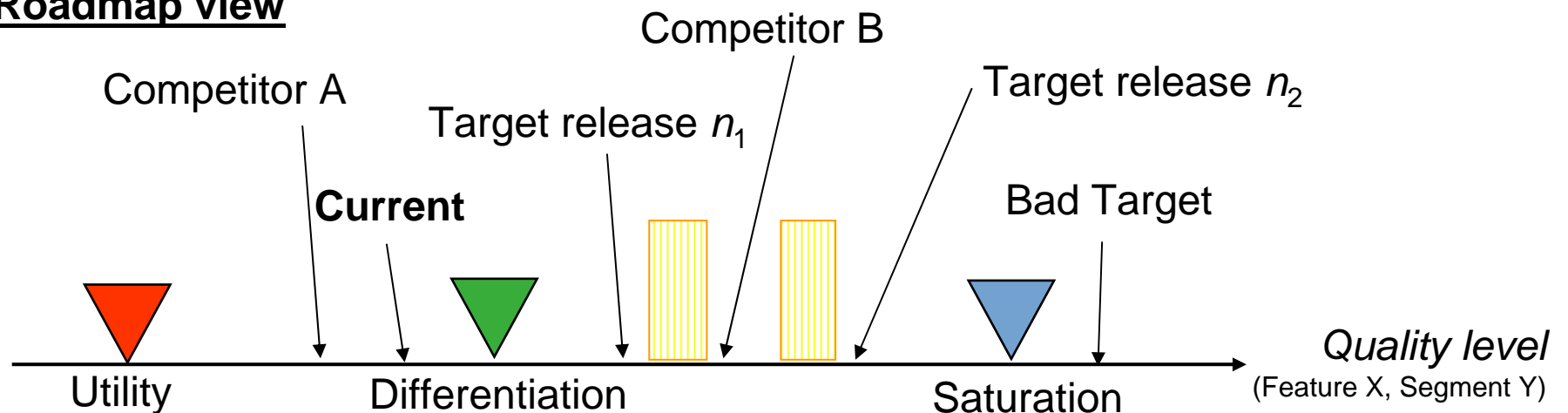
Benefit view



Cost view



Roadmap view



QUPER

Expected Gains



- Making tacit requirements explicit
- Coherent terminology across organizations
- More qualified scoping debate
- Documented rationale
- Support change management
- Better decisions -> More profitable products

Future technology needed for:

- Quality requirements
- Natural language requirements
- Dependencies among requirements
- Finding your way in very large requirements databases
- Cross-organizational requirements engineering processes

Further reading

- [IST2007] **"Requirements Engineering Challenges in Market-Driven Software Development – An Interview Study with Practitioners"**, Lena Karlsson, Åsa G. Dahlstedt, Björn Regnell, Johan Natt och Dag, Anne Persson, Accepted for publication in Information and Software Technology: Special Issue on Understanding the Social Side of Software Engineering, Qualitative Software Engineering Research, 2007.
- [EMSR2005] **"Market-Driven Requirements Engineering for Software Products"**, Björn Regnell and Sjaak Brinkkemper, Chapter in *Engineering and Managing Software Requirements*, Eds A. Aurum and C. Wohlin, Springer-Verlag, ISBN 3-540-25043-3, 2005.
- [REFSQ2007] **"A Quality Performance Model for Cost-Benefit Analysis of Non-functional Requirements Applied to the Mobile Handset Domain"**, Requirements Engineering: Foundation for Software Quality (REFSQ2007), Lecture Notes in Computer Science, Volume 4542/2007, pp. 277-291.

http://www.cs.lth.se/home/Bjorn_Regnell/ ->follow link to *Publications*

Thank you!

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